1.1 Data Fusion Thread Overview.

Data Fusion involves computations using constants, measurement values, health values or other fusion values. The result of the computation is a value which has a type equal to the data fusion Function Designator (FD) found in the CLCS Databank. Each fusion FD found in the databank has the same attributes that any other FD of the same type would have with the exception that a Fusion FD does not have a hardware record but does have a fusion algorithm table associated with it. The user may use the CLCS data Fusion Editor to aid in the input of the fusion algorithm and associated information.

The Data Fusion Thread establishes the CLCS capability to provide information using multiple FDs. This thread will support initial Data Fusion editing, loading, processing, distribution, system viewing, logging and retrieving.

1.2 Data Fusion Thread Concept

The Data Fusion thread can be divided into two segments, a user development segment, and a run time segment.

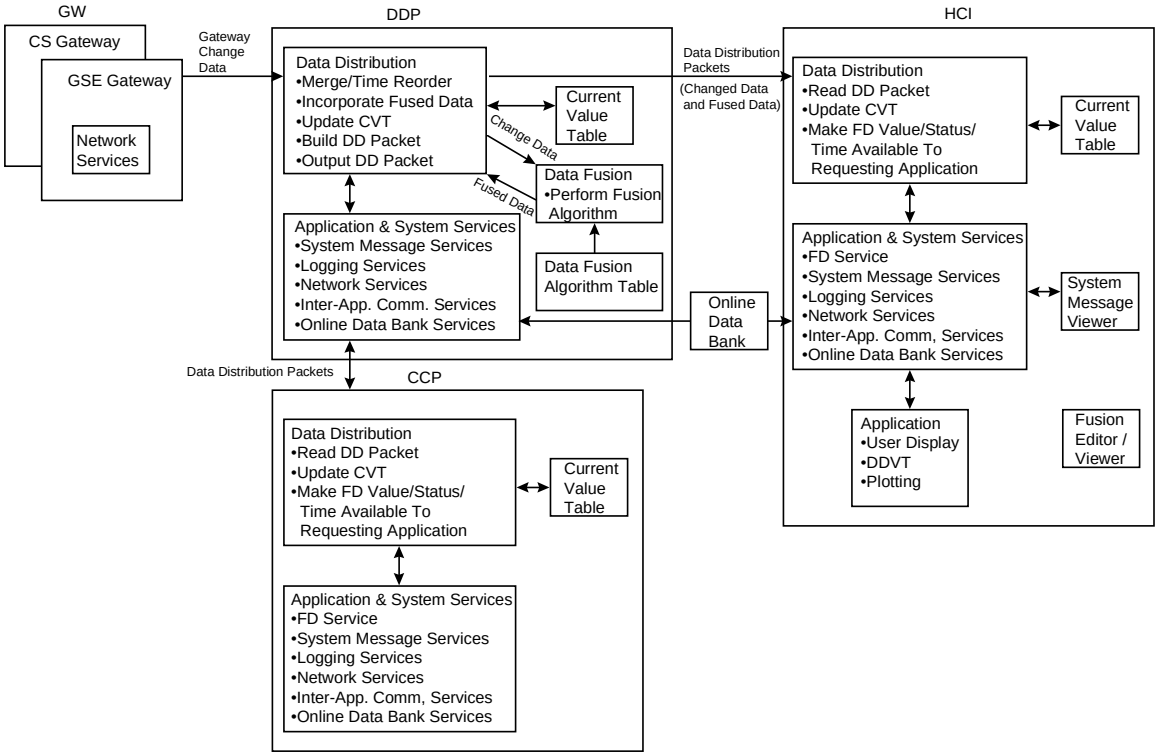
The user development segment involves:

- Offline definition of Data Fusion algorithms, via the use of a Data Fusion Editor/compiler.
- Integrate Test build of the Data Fusion Algorithm Tables
- Users adding Fusion FDs to the Data Bank

The run time segment consists of the following:

- Loading the Data Fusion Algorithm Tables at the DDP
- Performing Data Fusion processing on specified FDs received at the DDP, based on algorithms defined for the associated FDs.
- Users change parameters in fusion algorithms.
- Users displaying components of FDs on the Data Fusion Viewer at the HCI.
- Capability to inhibit processing fusion via the engineering inhibit bit.
- Fused FDs being recorded and made available for retrieval

Data Fusion Thread - Concept Diagram



1.3 Data Fusion Thread Specification

Following is a high level listing of the functions supported by the Data Fusion Thread:

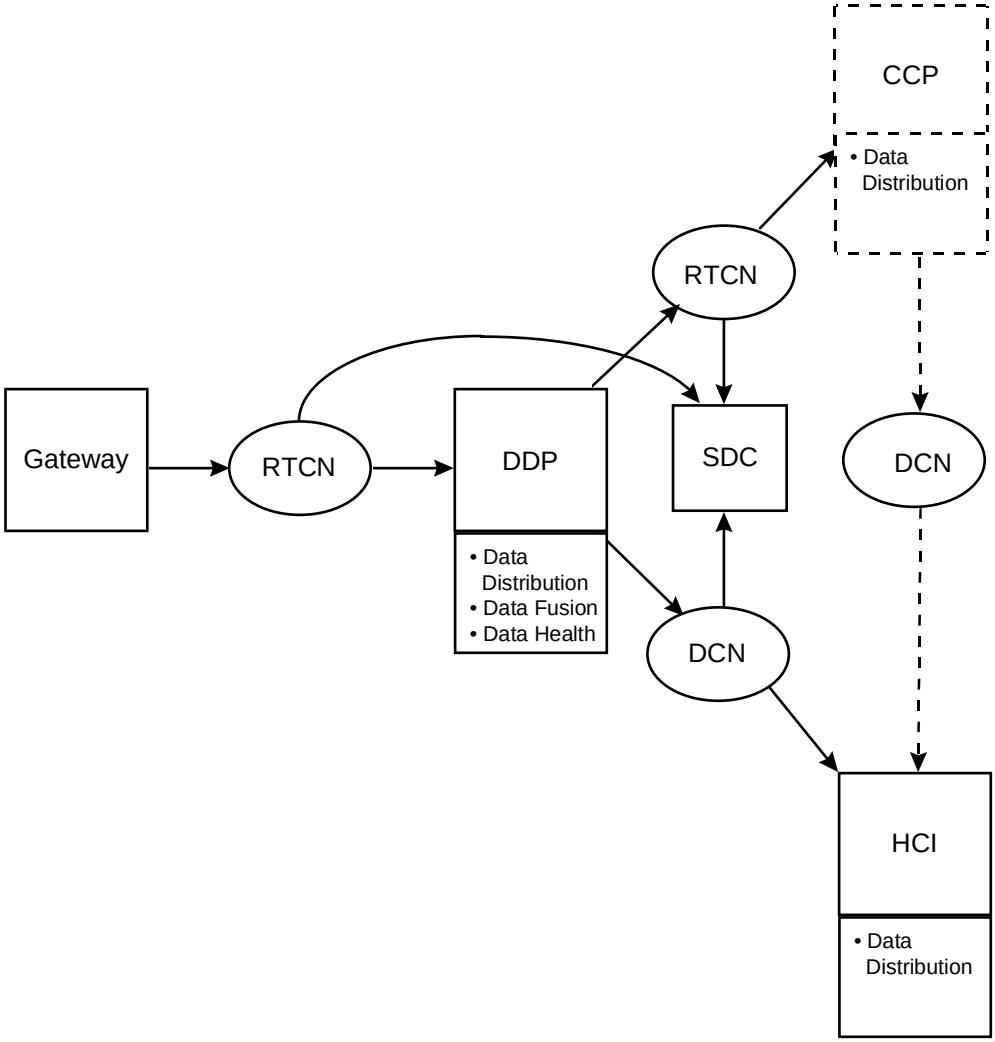
Statement of Work

- Define the list of logical and mathematical function required by the users for Data Fusion FD's.
- Define the list of logical and mathematical functions required by the users for Data Fusion Health.
- Define the Data Fusion FD types.
- Determine if a COTS tool can be utilized and provide the selected tool.
- Provide the initial Pre-build Data Fusion Editor.
- Provide the Data Fusion capability as part of the CLCS DDP Group.
- Provide the capability for Fused FD's to be utilized by the Data Distribution Manager for both the CCP and the HCI.
- Provide the capability to add fused FD's to the Data Bank.
- Provide the capability for Fused FD's in the Test Build process.
- Provide an initial System Viewer with the minimum capability to view Fused FD's., including the Fused FD value, associated input FD values and the function being used to generate the Fused FDs.
- Incorporate fused FDs into the record and retrieve capability with the same capability as Gateways FD's and User Application Derived FD's.
- Provide the capability for Fused FD's to be utilized by the Constraint Manager Function.
- Provide the capability for the Data Fusion Function to be utilized in both Operational and Application environments (e.g. DDP & HCI/DDP/CCP?GW/MM Logical Subsystems).
- Provide performance data for system modeling.
- Provide Capability to inhibit processing on individual Fusion FD's.

1.4 Data Fusion Thread Assessment Summary

Number	CSCI/HWCI Name	CSCI Labor (Labor Month)	Redstone EP (Labor Months)	Base Cost Coverage
1	Data Distribution Procssing CSCI - Data Distribution CSC			Data Distribution Thread
2	Data Distribution Processing CSCI - Data Fusion CSC	24.0 mm	9.0 mm	
3	System Services		0	Reliable Messages Phase 2 Thread
4	Application Services		0	Data Distribution Thread
5	System Viewers		0	User Display Monitor and Plotting thread
6	System Control		0	System Build and Load Thread
7	Consolidated System Gateway Services		0	System Build and Load Thread
8	CLCS Development Environment ■ CM tool & Development tool ■ Data Fusion Editor/Compiler	48.0 mm	0	■ Covered by Facility Requirements
9	TCID Build & Control		0	Test Build, Load & Activation Thread
10	Data Bank		0	Test Build, Load & Activation Thread
11	Data Recording & Archival		0	Data Distribution Thread
12	Data Retrieval		0	Data Distribution Thread
	TOTAL	72.0 mm	9.0 mm	

1.5 Data Fusion Thread Hardware Diagram



1.6 Data Fusion Thread Deliverables

The Data Fusion task for Redstone is to find the best in class tool for Data Fusion run time processing and for Data Fusion Editor. Common tools that can support multiple functions will be highly desirable. For example, a tool that can be used to support both End Item Manager and Data Fusion.

The following deliverables will be provided for the evaluation effort

- Data Fusion and Editor specifications
- Data Fusion run time specifications
- COTS evaluation report to provide recommendation based on weighed criteria

If the right tool is found, the following will be delivered for user testing for Redstone

- The COTS tool
- Documentation provided by the vendors

1.7 Data Fusion Thread Schedule

ID	Task Name	Start	Finish
	Data Fusion Key Dates		
	Redstone Assessment Kickoff	2/26/97	2/28/97
	Concept Design Panel Internal Review	3/12/97	3/12/97
	Concept Design Panel	3/26/97	3/26/97
	Define Data Fusion Editor & Run time processing specification	4/21/97	4/30/97
	Specification Review	5/02/97	5/02/97
	Identify candidate COTS to be evaluated	5/02/97	5/15/97
	Evaluate Candidates	5/16/97	6/16/97
	Evaluation Report available	6/30/97	6/30/97
	Install COTs (if the right one is found) -- Test Bed installation	7/01/97	7/04/97
	Test Bed verification	7/07/97	07/11/97
	Test licensed COTS tool available for user Application testing	7/14/97	7/14/97

ID	CSCI Name	Key Dependencies	Need Date	Available Date
1	System Services	Test Bed Platform Load capability for Fusion COTs	7/01/97	

1.8 Data Fusion Thread Simulation Requirements

N/A

1.9 Data Fusion Thread System Test Requirements

N/A. In lieu of System test, the Data Fusion COTs tool will be released to the users for testing.

1.10 Data Fusion Thread Training Requirements

User training will be limited to informal training of the following:

- Demonstration on usage of the COTS tool.

1.11 Data Fusion Facilities Requirements

- The Data Fusion Thread will be requiring only a subset of the same facility setup as the Data Distribution Thread. Refer to the Data Distribution Thread package for a list of the requirements.

1.12 Data Fusion Thread Procurement

- Potential procurement of a COTs tool for Data Fusion processing.
- Potential procurement of a COTs Data Fusion Editor.

1.13 Data Fusion Dependencies

Number	CSCI/HWCI Name	CSCI/HWCI
1	System Services	CSCI
2	Training	(Vendor and Thread personnel)
3	SDE-H, SDE-1, SDE-2 and IDE	(Facility and HWCI)
4	Performance Evaluation Support	(SE Performance group)

1.14 Data Fusion Thread Action Items/Resolution

- Data Fusion requirements in regards to health transformation need to be defined. (How to determine the resultant health when fusion logic is applied to FDs of different health.). Proposed resolution is to perform OR operations on the health of all FDs associated with the fusion operation.

2. CI Assessments

2.1 Data Distribution and Processing CSCI Assessment

Data Fusion CSC Work Required

- Determine if a COTS tool can be utilized and provide the selected tool.
- Provide the Data Fusion capability as part of the CLCS DDP Group.
- Provide the capability for Fused FD's to be utilized by the Data Distribution Manager for both the CCP and the HCI.
- Provide the capability for Fused FD's to be utilized by the Constraint Manager Function.
- Provide the capability for the Data Fusion Function to be utilized in both Operational and Application environment (e.g. DDP & HCI/DDP/CCP/GW/MM Logical Subsystems)

Function Name	CSCI Labor (EP)	% of CSCI	Function EP
COTS Tool evaluation and selection	9 mm		9 mm
Data Fusion Capability (if make)	19 mm		0
Fusion FDs utilization by Data Distribution	2 mm		0
Fusion FDs utilization by Constraint Mgr	2 mm		0
Fusion Function in both Operational and Application Environments	1 mm		0
TOTAL	33 mm		9.0 mm

Lines of Code

4,000 SLOC

Documentation

The following documentation will be provided:
- Data Fusion Design Specification
- Data Fusion User's Guide

Assumptions

Refer to the Data Fusion Thread Action Items/Resolutions in Section 1.14.

Open Issue

Refer to the Data Fusion Thread Action Items/Resolutions in Section 1.14.

2.2 System Services CSCI Assessment

Note: The System Services CSCI capabilities to be provided in support of the Data Fusion Thread is identical to the services to be provided for Data Distribution Thread. Refer to the Data Distribution Assessment package for a description.

2.3 Application Services and Tools CSCI Assessment

Note: The Application Services CSCI capabilities to be provided in support of the Data Fusion Thread is identical to the services to be provided for Data Distribution Thread. Refer to the Data Distribution Assessment package for a description.

2.4 System Viewers CSCI Assessment

The following capabilities will be provided by the System Viewers CSCI in support of the Data Fusion Thread:

System Views Work Required

- Provide Data Fusion Viewer

CSCI Assessment

Cost and assessment is provided by the User Display Monitor and Plotting Thread.

Lines of Code

Refer to the User Display Monitor and Plotting Thread Assessment package.

Documentation

Refer to the User Display Monitor and Plotting Thread Assessment package.

Assumptions

Refer to the User Display Monitor and Plotting Thread Assessment package.

Open Issues

Refer to the User Display Monitor and Plotting Thread Assessment package.

2.5 System Control CSCI Assessment

Note: The System Control CSCI capabilities to be provided in support of the Data Fusion Thread is identical to the services to be provided for Data Distribution Thread. Refer to the Data Distribution Assessment package for a description.

2.6 TCID Build & Control CSCI Assessment

The following capabilities will be provided by the TCID Build and Control CSCI in support of the Data Distribution Thread:

Table Build Work Required

- Provide the capability to build Data Fusion Algorithm Tables.
- Provide Online Data Bank

CSCI Assessment

The cost and assessment is being provided by the Test Build, Load & Activation Phase 1 Thread.

Lines of Code

Refer to the Test Build, Load & Activation Phase 1 Thread assessment package.

Documentation

Refer to the Test Build, Load & Activation Phase 1 Thread assessment package.

Assumptions

Refer to the Test Build, Load & Activation Phase 1 Thread assessment package.

Open Issues

Refer to the Test Build, Load & Activation Phase 1 Thread assessment package.

2.7 Data Recording & Archival CSCI Assessment

The following capabilities will be provided by Data Recording & Archival in support of the Data Distribution Thread:

Record to SDC Work Required

Note: The System Control CSCI capabilities to be provided in support of the Data Fusion Thread is identical to the services to be provided for Data Distribution Thread. Refer to the Data Distribution Assessment package for a description.

2.8 Application Editors & Compilers CSCI Assessment

The following Application Editors & Compilers CSCI functions will be provided in support of the Data Fusion Thread:

Data Fusion Editor/Compiler CSC Work Required

- Determine if a COTS tool can be utilized and provide the selected tool.
- Provide the initial Pre-build Data Fusion Editor.

CSCI Assessment

Function Name	CSCI Labor (EP)	% of CSCI	Function EP
COTS Evaluation	4 mm		0 mm
Initial Data Fusion Editor	44 mm		3 mm
TOTAL	48 mm		3 mm

Lines of Code

TBD, pending result of COTS evaluation.

Documentation

The following documentation will be provided:
- Data Fusion Editor Design Specification
- Data Fusion Editor User's Guide

Assumptions

Refer to the Data Fusion Thread Action Items/Resolutions in Section 1.12.

Open Issue

Refer to the Data Fusion Thread Action Items/Resolutions in Section 1.12.

3. COTS Products Dependencies

3.1 SW Products Dependency List

Pending market survey, a COTS product for Data Fusion may be utilized.

3.2 HW Products Dependency List

Gateway, DDP, CCP, HCI and Network hardware are covered under the Data Distribution Facility Requirements in section 1.11.